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ABSTRACT

A study examined current research on the proficiency of vocational students in basic skill areas and explored current practices for improving the basic skills of vocational students at the secondary and postsecondary levels. Based on current research, vocational students, on an average, seemed to be less proficient in basic skills than were their academic track counterparts and made smaller gains in proficiency during their high school years. In addition, it appeared that basic skill proficiencies were more strongly associated with school-related outcomes such as further schooling and higher grades than with employment-related outcomes such as job placement and wages. An analysis of the strategies and approaches used by vocational educators in providing instruction in basic skills revealed that such strategies are likely to use a combination of the following four approaches: (1) remediation, or a compensatory approach; (2) reinforcement, or a support-oriented approach; (3) alternative schools, or a total organizational approach; and (4) inservice training, or an instructional improvement approach. Because the research on basic skills and vocational students is not a rich literature, researchers need to focus more attention on improving the methodological adequacy of available research and on filling in substantive gaps in existing research. Search strategies and sample characteristics tables are appended. (MN)

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BUILDING BASIC SKILLS:
RESULTS FROM VOCATIONAL EDUCATION

Linda S. Lotto

The National Center for Research in
Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1983

CE 036 466

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FOREWORD

One of the objectives for the National Center's series of state-of-the-art papers is to provide "benchmark" reports in critical areas. These areas are selected on the basis of timeliness, criticality, and relevance to the employment and training concerns of practitioners, policymakers, educators, and business people. Each paper is designed to synthesize and integrate existing literature and to provide analyses of gaps, deficiencies, and areas of consensus and contradiction. The papers are potentially useful to a wide range of audiences including local administrators, federal and state policymakers, and researchers.

This paper by Linda S. Lotto provides useful background for vocational educators interested in the proficiency of vocational students in basic skills areas. In the first section she synthesizes current research on the relationship of those proficiencies relative to (1) other student groups, (2) proficiencies at program entry, and (3) program outcomes, such as employment, wages, and further education. This synthesis provides a comprehensive basis for thinking about strategies for improving the basic skills of vocational students. These strategies are described in the second section, in which the author aggregates reports of current practices for improving the basic skills of vocational students at secondary and postsecondary levels. In conclusion, a set of recommendations for researchers, policymakers, and practitioners is laid out.

We anticipate that this effort will contribute to both future research and practice by giving researchers and practitioners a *cumulative* sense of the work in the area. There is a continuing need for vocational educators to improve and reinforce the basic skills proficiencies of their students, and we anticipate that this paper can form a basis for future efforts.

Special thanks are owed to Nina Selz, now of the Xerox Training Center, and Richard Ruff, now of Huthewaite, Inc., who made substantial contributions to the completion of this report. Appreciation is also extended to Deborah Black, Mary Naille, and Kathy Haycook, who spent many hours in manuscript preparation. Final editing of the document was provided by Catherine C. King-Fitch.

Robert E. Taylor
Executive Director
National Center for Research
in Vocational Education

EXECUTIVE SUMMARY

This paper was conceived in response to the concern and need for vocational students to be prepared in both occupational and basic skills areas. It represents a systematic aggregation of research evidence in two areas: (1) the development of basic skills in vocational students and (2) current practices for reinforcing basic skills in vocational education.

In the first area the author presents five generalizations that describe what is currently known about the basic skills proficiencies of vocational students. Vocational students on average seem to be less proficient in basic skills than their academic track counterparts and make smaller gains in proficiency during their high school years. Basic skills proficiencies are more strongly associated with school-related outcomes—further schooling, higher grades—than with employment-related outcomes—placement, wages.

In the second area the author describes the strategies and approaches used by vocational educators in providing instruction in basic skills for their students. These strategies are likely to use a combination of four approaches: (1) remediation, or a compensatory approach; (2) reinforcement, or a support-oriented approach; (3) alternative schools, or a total organizational approach; or (4) inservice training, or an instructional improvement approach.

In the final section of the paper the author discusses future research issues, policy implications, and recommendations for practitioners generated from these data.

INTRODUCTION

A central function of public schooling in America is the education of students in "basic skills" areas, that is, reading, language, and mathematics. These skills are considered basic to successful participation in adult society, e.g., further education, occupational competence and employability, and upward social mobility. However, educators, employers, and the general public have expressed growing concern about the perceived decline in basic skills proficiency demonstrated by American youth in school, on standardized tests, and on the job.

Although this concern is generalized across all student populations, it represents a particularly acute problem for vocational educators. The vocational curriculum is oriented to occupational skill training, with the express intent of aiding youth in securing and maintaining employment. As a result, the highest priority resource and time allocations are for technical skill training, not instruction in basic skills. However, if vocational students are not adequately prepared in basic skills areas, they will not only have difficulty with their vocational or occupational training but also experience difficulty in finding employment and in later performance on the job.

Appropriate interventions to redress this problem cannot be devised until teachers, administrators, and policy planners have a better picture of (1) the extent to which vocational students are deficient in basic skills, (2) the importance of basic skills for employability and job performance, and (3) available options for providing vocational students with basic skills instruction.

Existing information on these issues is diffused throughout several bodies of literature and is only recently beginning to be aggregated (see Berryman 1980 and Corman 1980). It is the intent of this paper to systematically aggregate information under two broad areas: (1) basic skills proficiencies of vocational students and (2) current practices for reinforcing and remediating basic skills involving vocational education. Specifically, the author sought to accumulate data relative to the following questions (each of which represents a substudy):

1. What are the basic skills proficiencies of vocational students?

    a. How do the basic skills proficiencies of vocational students compare with those of other student groups?
    b. How do the basic skills proficiencies of vocational students change from program entry to completion?
    c. What is the relationship between basic skills proficiencies and program outcomes, e.g., completion, employment, wages?

2. What practices involving vocational education are currently in use for remediating and reinforcing basic skills?

This study was a secondary source study; no primary source data were collected. Instead the researcher systematically searched for and aggregated evidence available in existing reports and

articles. The decision rules used to search for and identify potential data sources and select individual studies for each of the four substudies on which this paper is based are reported in the Appendix. In general, three types of sources were searched: (1) large-scale data files, such as ERIC and *Dissertation Abstracts*; (2) compendia of programs and research in vocational education, for example, *Current Projects in Vocational Education: Federally Administered Projects FY 1970-77*; and (3) references and citations in existing reviews and syntheses.

The raw data to be aggregated were the findings and conclusions of the sampled studies. These existed in both quantitative and qualitative forms (e.g., data tables, coefficients of relationship, generalizations and propositions about relationships, events or characteristics). In every instance a form of propositional analysis was used to recast statements of relationship, causality, processes, or outcomes into generalizations supported more or less powerfully by the sampled studies.

This monograph is organized in three major sections. The first reports evidence descriptive of the proficiencies of vocational students in basic skills. The second reports on current practices for remediating and reinforcing basic skills. The last section discusses the implications of this evidence for researchers, policymakers, and practitioners.

DESCRIBING THE BASIC SKILL PROFICIENCIES OF VOCATIONAL STUDENTS

Vocational students are equally likely to be described as less able or more able than the typical high school student, depending on the speaker's perception of vocational education. For example, if viewed as a "dumping ground," then vocational education will be expected to contain low-ability students. If, however, vocational education is viewed as a device for "creaming" the better students into elite programs of occupational training, the perception will be of more able students. What is missing is empirical evidence to support either position. In the subsections that follow, the accumulated data describing the basic skills proficiencies of vocational students are discussed relative to (1) other student groups, (2) their entry-level proficiencies, and (3) program outcomes, such as completion, employment, and wages.

Comparing Vocational and Nonvocational Students

The stereotypic vocational student is usually described relative to enrollees in the other two standard high school "curricula": the academic and general tracks. The problems inherent in these comparisons are not insignificant. For example, the adequacy of the tripartite high school curriculum is certainly questionable and the difficulties of assigning students reliably to one or another are not easily overcome. Similarly one must deal with the point in time of measurement and be certain that valid comparisons are made. At issue here is the definition and assessment of vocational education's role in basic skills instruction. Does vocational education attract a less able group of students to its program, and if so, does it serve them well?

Twelve different reports based on ten distinct data sets (see table A in the Appendix for a description of this sample of studies) represent the population of evidence about the basic skills proficiencies of vocational students as compared to other students. These include major national surveys, statewide assessments, and case reports of single high schools. Despite differences among the studies in scope of the data collection, nature of the basic skills measured, and the time of measurement, three phenomena were repetitively reported. These three are presented in the following subsections as generalizations which describe what we know about the basic skill proficiencies of vocational education students.

Generalization #1: Academic students are substantially more proficient across all basic skill areas than vocational students.

> Support: Hilton 1971; Alexander, Cook, McDill 1977; Creech 1974; Echternacht 1975; Evans and Galloway 1973; Grasso and Shea 1979; Massachusetts Assessment of Basic Skills 1979; Dennen 1979; Walter 1979.

The support for this generalization was overwhelming. Nine out of ten studies provided evidence that academic or college preparatory students are substantially more proficient in basic skills areas than vocational students. Data supporting this notion exist at vocational program entry (ninth or tenth grade) as well as at the time of high school graduation (grade twelve).

Particularly strong evidence can be found in the Academic Growth Study data. This survey was developed to follow the "academic growth" of students over time. Sampled students were tested every two years on a wide range of basic skills proficiencies. The distinction between academic and other students (including vocational) is exemplified by the following:

> At grade 11 approximately four years of achievement separate the academic students from the vocational, home economics, and business students. In other words, by grade 11, the vocational, business, and home economics students achieve on an average a level of sophistication in mathematics which the academic students had achieved in grade 7. (Hilton 1971, p. 51)
>
> As early as grade 5 the differences in test scores between students who later entered academic and various nonacademic programs were of approximately the same magnitude as at the grade 11 level. (Hilton 1971, p. 172)

Fairly consistently across basic skills areas, academic students are roughly one standard deviation ahead of the nonacademic groups. Creech (1974) provides a breakdown by specific skills:

- **Vocabulary:** The difference between means of academic students and others is about one full standard deviation. (p. 41)
- **Reading:** The difference between means of academic and others is about 10 full points—a full standard deviation. (p. 42)
- **Mathematics:** Academic students are about one standard deviation above general students. Vocational-technical students scored below general students, but only by about 1-1/2 points at the median. (p. 43)
- **Composite ability:** The measured ability of academic students is about one standard deviation above that of other students, and there is no appreciable difference in the ability scores of general and voc-tech students. (p. 44)

For the reader who is wont to dismiss this evidence as obvious, expected, and therefore not particularly interesting or important, Hilton (1971) aptly puts the situation in perspective:

> One implication of the main effect of the curriculum factor . . . for the vocational and educational guidance of such students is the significantly lower achievement of the nonacademic group. Not only is their performance uniformly lower, but it is also more uneven. *The practical importance of such differences . . . lies in the need to re-think the kind of education it is we want non-college-bound students to receive, and whether or not such present performance reflects the expectations and attitudes of the educational community toward these students.* (p. 88) (emphasis added)

This issue is of particular importance to vocational educators because not only is their clientele currently non-college-bound, but also the vocational curriculum is the only curricular area within the secondary school that consciously prepares students for something other than college. Vocational education could take leadership in defining and legitimizing education for non-college-bound youth in this country.

Generalization #2: Secondary school curriculum enrollment distinguishes among students by academic achievement and ability

Support: Hilton 1971; Alexander, Cook, and McDill 1977; Echternacht 1975; Evans and Galloway 1973; Grasso and Shea 1979; Massachusetts Assessment of Basic Skills 1979; Dennen 1979; Walter 1979.

There are two corollaries to Generalization #2:

2.1: The distinction among students within schools by ability is remarkably durable. It appears as early as grade 5 (Hilton 1971) and persists into later life in the form of wages, occupational prestige and social stratification (Wiley and Harnischfeger 1980; Jencks et al. 1972).

2.2: However, despite the differences in mean achievement, the nonacademic student groups display a full range of abilities and achievements (Evans and Galloway 1973; Dennen 1979). Although the means are distinct, the distributions overlap.

This generalization also received wide support. The gist of this observation is not to repeat Generalization #1, but to note that the different high school curricula—no matter how defined—tend to reflect student self-selection in terms of ability and achievement. Much of the research on the determinants of curriculum enrollment has concentrated on developing structural equations. The results have been mixed. According to Alexander and McDill (1976), the major direct determinants of enrolling in a college preparatory track are ability, achievement, and ninth grade curriculum plans. However, over 60 percent of the variance in curriculum enrollment is left unexplained by these factors.

Heyns, in her analysis of the Equality of Educational Opportunity (EEO) data base, sums up her findings on the determinants of curriculum enrollment thus:

> The first conclusion is that educational stratification largely results from differential performance on achievement tests. . . . Second, curriculum assignment differentiates and labels students academically. (Heyns 1973, p. 1449)

It is clear that high school students, in selecting the courses they will enroll in, do sort themselves out in terms of academic ability and achievement. Those differences are influenced both directly and indirectly by socioeconomic status (Alexander, Cook, and McDill 1977; Heynes 1973). Thus, differences in abilities, interests, and peer groups, which appear as early as the elementary grades may persist into and beyond high school. To the extent that achievement and proficiency in basic skills areas are associated with desirable educational, social, and economic outcomes, students of low socioeconomic status and/or low achievement (actual or perceived) levels may be self-selecting themselves away from those outcomes.

Generalization #3: Vocational students cannot be reliably distinguished from general track students on measures of basic skill proficiencies.

Support: General track students more proficient—Creech 1974; Grasso and Shea 1979; Massachusetts Assessment of Basic Skills 1977 (reading and writing only); Ludeman 1976 (math only)

General track students indistinguishable—Echternacht 1975

General track students less proficient—Hilton 1971; Evans and Galloway 1973; Dennen 1979; Massachusetts Assessment of Basic Skills 1979 (math only)

This generalization differs from the other two in that it is an inference from contradictory evidence, and is therefore speculative in nature. Essentially it says that using self-report indicators of curriculum enrollment and standardized test score data, we are unable to distinguish reliably between vocational and general track students. One explanation for the unreliability of evidence in our efforts to distinguish between these two groups may reside with the mode of determining curriculum enrollment. Most studies used student self-selection—a technique that has received wide criticism, not only because students' perception of the curriculum in which they are enrolled changes, but because of the wide discrepancy between students' and administrators' ratings of curriculum enrollment (Fetters 1975).

While it seems likely that general students are similar to vocational students on measures of ability in basic skills and achievement, they may be quite dissimilar on other dimensions. Echternacht's analysis of the Class of '72 data shows that general and vocational students are more likely to be distinguished on such variables as self-esteem, occupational contacts, alienation, ratings of the school, assessment of the counseling program and plans for working full time (1975, table 1, pp. 10-12) than on basic skills proficiencies.

Following up on Berryman's (1980) image of vocational education as a "niche," one might imagine the academic curriculum as providing a niche for the college-bound, the vocational curriculum as providing a niche for the employment-bound, and the general curriculum as circumscribing a pool of undecided, more alienated, and more uncertain youth than the other two groups.

The Development of Skills from Program Entry to Exit

It has been argued that vocational courses provide opportunities for less able students to develop in areas not requiring proficiency in basic skills—for example, in psychomotor skills. However, employers and others maintain that basic skills proficiencies are essential to developing employability, that specific occupational skill development alone is insufficient. At issue, then, is the development of basic skills in vocational courses. Does enrollment in a vocational curriculum inhibit the development of basic skills by limiting the opportunities a student has to practice and use those skills? Or does enrollment in a vocational curriculum enhance basic skills development by relating those skills to relevant, real-life applications?

Existing evidence on the effect of curriculum enrollment on the basic skills proficiencies of vocational students is meager. Of the thousands of items reviewed for this effort, only four met the substantive criteria for inclusion. Essentially those criteria specified that, to be included, studies must measure the basic skills proficiencies of vocational students at two points in time approximating program entry and completion. The following types of studies were *excluded* on the grounds that they dealt with nonvocational or special subsets of vocational students:

1. Evaluations of experienced-based career education programs
2. Evaluations of compensatory education programs for disadvantaged vocational students
3. Evaluations of cooperative work experience and experiential education programs

Only two national longitudinal surveys measured basic skills achievement more than once: the Academic Growth Study (Hilton 1971, and Alexander, Cook, and McDill 1977) and Project TALENT (Evans and Galloway 1973). Ludeman's (1976) report of the Minnesota statewide assessment in mathematics is included because his technique for defining a vocational student allowed comparisons to be made among students with high, moderate, and low levels of vocational course experience. Table B in the Appendix summarizes the characteristics and findings of these four studies.

As described in the previous section, an attempt was made to develop summary generalizations from a synthesis of the findings and conclusions of the four studies. However, generalizations based on such a small number of studies are probably best viewed as working hypotheses, as "clues" to follow in investigating the effect of vocational curricula on the development of basic skills.

Available evidence points to the following generalization as a likely description of the development of basic skills proficiencies in vocational students:

Generalization #4: The basic skills proficiencies of vocational students improve from program entrance to completion. However, vocational students make smaller gains in basic skills areas than their academic track peers.

Support: Ludeman 1976; Alexander, Cook, and McDill 1977; Hilton 1971; Evans and Galloway 1973.

The proficiencies of most high school students improve during their high school years. Evidence from Hilton (1971) suggests that vocational students are no exception. By converting Hilton's data to standard measures of effect, we can more readily assess the gains of vocational students and their academic and general track counterparts. Table 1 displays the average effect of three curricula on the development of basic skills. The numbers in the cells of table 1 are "effect sizes" and they express grade eleven means scores as distances from grade nine means in term of grade nine standard deviation units.

Figures 1, 2, and 3 illustrate graphically the effect sizes for academic, general and vocational curricula on the STEP reading test. In interpreting these statistics the reader should bear in mind that—

1. the effect size always expresses grade eleven scores in grade nine standard deviation units, and

2. the effect sizes are probably best understood as changes in the mean; that is, the mean for grade eleven relative to the mean for grade nine. This technique tends to obfuscate individual gains or losses in favor of an overall group profile.

Turning back to table 1, and using figures 1, 2, and 3 as illustrations, we see that—

1. all the effect sizes are positive, that is, in every instance the mean score for grade eleven was higher than the mean for grade nine and

2. with the exception of STEP-Listening, in every instance the gain of the vocational group was smaller than the gain of the academic group.

TABLE 1

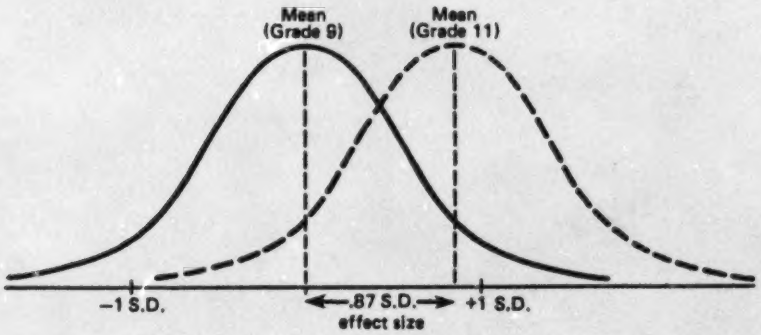
PROFICIENCY GAIN IN BASIC SKILLS FROM GRADE 9 TO 11
EXPRESSED IN GRADE 9 STANDARD DEVIATION UNITS

Measure	Curriculum		
	Academic	Vocational	General
SCAT – Q	.38	.36	.19
SCAT – V	.66	.45	.46
SCAT – T	.61	.46	.36
STEP-Math	.56	.45	.43
STEP-Reading	.87	.60	.63
STEP–Listening	.38	.48	.32
STEP–Writing	.63	.46	.61
STEP–Social Studies	.46	.30	.39
STEP–Science	.49	.63	.76

SOURCE: Based on data from Hilton 1971.

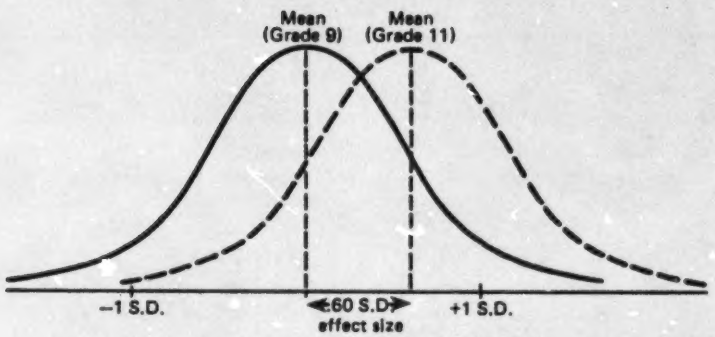
NOTE: An effect size is a common measure of treatment effectiveness, defined by Glass (1977) as "the difference between the means of the (experimental) and the control group, divided by the initial group standard deviation" (p. 362). The result is a number that expresses the distance of the experimental group from the control group mean in the control group standard deviation units. In this instance grade nine scores were used as the control group or criterion against which grade eleven scores would be compared. The effect size, therefore expresses grade eleven score as distances from grade nine means in grade nine standard deviations.

Figure 1



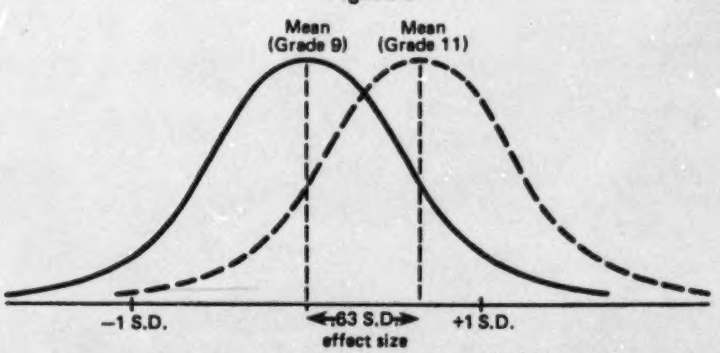
Effect size for academic students, STEP Reading

Figure 2



Effect size for vocational students, STEP Reading

Figure 3



Effect size for general students, STEP Reading

Ludeman (1976) provides some interesting support for the observation that vocational students make smaller gains than their academic track peers. He compares math achievement for students who completed one to two, three to four, and five or more vocational courses during grades ten through twelve. Although the differences were slight, in three out of seven vocational program areas, achievement declined as the number of vocational courses increased.

> The achievement of home economics students with three or four courses declines to 46.2 percent, and to 43.4 percent with five or more courses. (Ludeman 1976, p. 5)

In other words, Ludeman found that for some vocational curricula, achievement varied inversely with the intensity of the vocational experience.

In absolute terms it seems likely that the proficiencies of vocational students improve during high school, but to a lesser extent than those of academic students. The implications of this situation depend in large part on one's perspective. If the stratified curriculum is viewed as an educational and social asset, as a means to encourage, motivate, and fulfill the academically less able student, then these findings are neither surprising nor troublesome. But if one sees curricular stratification as a means of perpetuating social and economic stratification and inequity, then these findings are quite troublesome, for they indicate that certain pupils are being systematically denied access to the means of acquiring social power and prestige.

Relationships to Program Outcomes

Among the desired outcomes of vocational program enrollment are high school graduation, employment, postsecondary training, and high wages. It is likely that basic skills proficiency is related to some, or all, of these outcomes. It has been argued that vocational students need only to meet the minimum proficiency levels for the specific occupation for which they are training. Other arguments are based on the need to maximize every student's basic skills proficiencies in order to seek, maintain, and advance in the work place.

Although the data sources aggregated in this section vary in terms of approach, intent, and educational level, all show an effort to systematically relate the basic skills proficiencies and aptitudes of vocational students to specific program outcomes, such as completion, grade point average, and earnings. Table C in the Appendix displays the sampled studies by outcomes and indicators of proficiency in basic skills. Studies were not included which—

- focused on adult, military, corrections, or other special student populations
- related basic skills proficiencies and educational outcomes for a general student population, that is, did not define a study population of vocational students.

This criterion also excluded the broader literatures of educational and status attainments and school effects (see Tinto 1977; Jencks 1972; O'Malley 1977; and Grasso and Shea 1979).

Based on the fourteen sampled studies, the following generalization summarizes what is currently known about basic skills of vocational students and vocational program outcomes.

Generalization #5. In relation to earnings and employment basic skills proficiencies are "threshold" variables. That is, their effect is insignificant until a certain level of proficiency is reached, at which point they account for a significant change in employment and earnings.

Support: Berryman 1980; Hofferth 1980; Wiley and Harnischfeger 1980; Darcy et al. 1974.

This generalization is at best speculative. There is some evidence that vocational students earn more than other groups in the years immediately after high school (Darcy et al. 1974; Wiley and Harnischfeger 1980). However this advantage seems directly related to the employment experience of vocational students. Vocational students tend to move directly from high school into employment, while college preparatory students migrate to postsecondary and collegiate education and training, thus deferring immediate earnings. But by five years after graduation the nonvocational groups are becoming employed and the income advantage of the vocational students diminishes rapidly.

Wiley and Harnischfeger (1980) estimated the indirect effects of school experiences on wages and work hours as mediated through developed academic abilities to be small. They also noted a weakening of those relationships over time as individuals enrolled in postsecondary education and training enter the labor market (p. 105).

Berryman (1980) looks at this relationship from the perspective of the employer and suggests that "vocational education may have differential effects, depending on individual ability level" (p. 28). Using the finding by Grasso and Shea (1979) that academic aptitude makes a greater contribution to the earnings of vocational students than to those of academic and general students, Berryman goes on to state:

> Relative to the other curricula, vocational education increases pay for the academically able, but not less able student. This result suggests that academic ability may represent a relatively, "non-negotiable" hiring criterion for employers. *If* the applicant passes this "gate," *then* vocational skills at least increase wages (and probably employment rates). (1980, p. 29) (emphasis in original)

This leaves us with an image of academic ability acting as a *threshold* variable. According to Weick (1980), "threshold variables give constancy. They produce temporary connections among variables. As long as a disturbance is below threshold, the variables don't fire and the system is severed" (p. 34). Thus we find no connection between academic ability and wages for vocational students of low ability; but at higher levels of ability a connection is established and wages are increased.

We can also examine the relationship between academic abilities and vocational program outcomes in terms of the differential effect of academic ability on training and job performance. Berryman argues, based on Thurow's assessment (1979) of the elasticities of substitution for entry-level, noncollege jobs, that the youth labor market, at least for males, is primarily a market for training opportunities rather than developed skills. "In general, employers hire the ability to *acquire* job skills, not the skills themselves" (Berryman 1980, p. 28).

Academic achievement, as an indication of a student's ability to succeed at tasks the school holds central, may be used by employers to signal "trainability." Employers, in looking to fill jobs that are essentially training opportunities may look to hire individuals who have demonstrated the ability to be trained; that is, they have succeeded in school. Conversely, academic achievement bears very little on actual job performance.

> We must carefully distinguish between those educational processes that provide opportunities for access to different statuses (i.e., jobs in the occupational structure) and those leading to the acquisition of skills and values that influence people's ability to perform well in those statuses (jobs). (Tinto 1977, p. 203)

Thus we see that for vocational students of relatively high academic ability the provision of specific occupational skills yields access and productivity, while vocational students of low ability will generally be denied access. Although academic ability signals to employers that the individual is likely to succeed, to be trainable, these skills are not strongly related to job performance. Thus for vocational students, predicting success on the job is likely to involve assessments of both academic and occupational skills.

Summary

In the preceding section five generalizations were presented that describe what is currently known about the basic skills proficiencies of vocational students. They are summarized in table 2 along with an assessment of the strength of support for each. This assessment is based on both the *quantity* and *quality* of evidence supporting the generalizations. Two points need to be made in relation to table 2. First, the strong evidence is quite general in nature. We have some global indications about the basic skills proficiencies of vocational students, but information about intravocational ability differentials is nearly nonexistent. Second, basic skills proficiencies are more strongly associated with school-related outcomes than employment-related outcomes. Students who are competent in basic skills areas are likely to also be successful in other learning tasks—postsecondary training, achieving access to employment opportunities for which trainability is important, and so on.

TABLE 2

SUMMARY GENERALIZATIONS AND LEVEL OF SUPPORT

	Generalization	Support
1.	Academic students are substantially more proficient across all basic skills areas than vocational students.	Strong
2.	Secondary school curriculum enrollment distinguishes among students by academic achievement and ability.	Strong
3.	Vocational students cannot be reliably distinguished from general students on measures of basic skills proficiencies.	Speculative
4.	The basic skills proficiencies of vocational students improve from program entrance to completion. However, vocational students make smaller gains in basic skills areas than their academic track peers.	Speculative
5.	In relation to earnings and employment, basic skills proficiencies are "threshold" variables. That is, their effect is insignificant until a certain level of proficiency is reached, at which point they account for a significant change in employment and earnings.	Speculative

COOPERATIVE PRACTICES FOR REINFORCING AND REMEDIATING BASIC SKILLS AT SECONDARY AND POSTSECONDARY LEVELS

Many vocational educators tend to find themselves in the ticklish situation of instructing those students least able in basic skills and therefore most in need of assistance, but with resources allocated for occupational skill development only. Research evidence shows a gap of from two to five years between the reading ability of vocational students and the mean readability of vocational texts (Karnes and Ginn 1976). Less able students are frequently counseled into vocational courses and programs. This process is based on the assumption that students who are unsuccessful in academic pursuits will find vocational subjects simultaneously more relevant and more manageable. These students need both remediation and reinforcement in basic skills areas.

Another, larger group of vocational students is adequately proficient in basic skills areas but needs to continue development in these areas simultaneously with development in technical skill areas. Once again vocational educators must turn to general educators to develop cooperative arrangements for reinforcing basic skills for their students.

The data sources used in developing this typology were case descriptions of actual programs or projects. Two decision rules were used to select the study sample:

1. Substantive criterion—Each case must demonstrate cooperation or coordination between general and vocational education in the provision of basic skills instruction.

2. Qualitative criterion—Each study must describe an intervention or arrangement *in use* to improve the basic skills proficiencies of secondary and/or postsecondary students.

These rules excluded (1) curriculum materials developed to reinforce basic skills and (2) recommendations, plans, and/or rhetoric for improving basic skills instruction. The final inventory consisted of twenty-seven items: fourteen describing interventions at the secondary level and twelve at the postsecondary level (ten case reports and two surveys of multiple programs). The technique used to integrate these items was simply to identify look-alike groups based on gross program characteristics (e.g., goals, format, target population). The result is a taxonomic effort to describe current cooperative practices between general and vocational education to reinforce basic skills. Thus, instead of generalizations, this section will provide descriptions of basic *types* of reinforcement and remediation practices.

Secondary Practices to Reinforce and Remediate Basic Skills

At the secondary level, the typical cooperative effort to reinforce basic skills—

- is locally supported,
- is directed to disadvantaged, dropout-prone students,

- favors an integrated vocational-academic approach to curricular content and structure, and
- emphasizes an individualized approach to instruction.

The typical secondary school strategy is a local effort to respond to the needs of non-college-bound, low-achieving, disadvantaged students. Most programs try to mix some basic skills instruction (frequently in a vocational context) with either work experience or occupational skill training.

There seem to be four basic approaches: (1) compensatory, (2) support-oriented, (3) alternative schools, and (4) inservice training. Of the fourteen secondary programs uncovered by this search, eight exemplify Approach #1, three exemplify Approach #2, two exemplify Approach #3, and only one fits Approach #4. Table D in the Appendix displays the sample programs by type. The reader should note, however, that the programs and practices inventoried here were only those included in national outlet data bases, such as ERIC files and *Federally-Administered Projects in Vocational Education*. There are undoubtedly numerous examples reported via local or state outlets that this report did not include. This sample of fourteen programs is therefore argued to be necessary but insufficient to understand the full range of current practices in which general and vocational education are cooperating to reinforce the basic skills proficiencies of secondary students.

Compensatory or Remedial Programs

These are programs designed for low-achieving, disadvantaged, low socioeconomic status students who are unable to succeed in regular classrooms. This approach to reinforcing basic skills emphasizes the integration of special academic and vocational curricula in a special program. The goal of many of these programs is the preparation of students for regular classrooms and/or employment.

An example of this type of program is Georgia's Coordinated Vocational Academic Education Program ("Georgia's Winning Way" 1979). This program is operated and financed out of the office of the state supervisor of special needs programs. CVAE offers vocational education for underachieving or alienated youth deemed likely to drop out. The program itself is a year-long course focusing on a combination of (1) occupational competencies and (2) remediation in basic skills. In addition the state has prepared materials covering life adjustment and career-seeking skills. In 1979 CVAE offered 157 programs across Georgia with an enrollment of approximately 12,500 disadvantaged students.

Support-oriented Programs

These programs are designed to provide basic skills instruction in support of vocational courses. The purpose of a "support" program is to *reinforce* existing proficiencies rather than to *remediate* deficiencies in basic skills areas. These programs typically use vocationally relevant materials or subject matter—for example, business math, vocational English—to teach basic skills. This approach serves a vocational student population. Although regular classroom teachers generally provide the actual classroom instruction, the curriculum is typically developed through the joint efforts of vocational and regular teachers.

An example of this approach is the Communication Skills Program in West Linn, Oregon (Schuberg and Canon 1972). This was an exemplary project aimed to help high school students

with industrial occupational goals achieve the practical communication skills necessary to gain employment. This program was planned by a group of industrial arts and language arts teachers. The language arts teachers spent considerable time familiarizing themselves with the curricular content in four industrial curriculum areas. They observed equipment, interviewed teachers, reviewed state guidelines, and surveyed the occupational publications for each field. They then generated inventories of communication skills for each area. "Job sheets" were developed for each skill, and the vocational instructors simply "plugged in" the content for their respective occupational field.

Alternative School Programs

A third approach is the development of alternative school programs emphasizing learning through work. Like most alternative schools, these are designed for students who are disaffected, alientated, or "turned off" by the regular secondary program. These alternative school programs are sometimes little more than direct work experience supported by a few required courses in basic skills areas. The alternative school concept is "pull-out" instruction carried to its logical extreme. Instead of separate classes or programs for these students, totally separate facilities are provided. The unsuccessful and disinterested students are bodily removed from the secondary school site. Alternative schools are typically smaller and more informal than regular schools; individualized attention and instruction are emphasized.

The Syracuse, New York Occupational Training Program (Wolff 1973) is an example of an alternative school approach for reinforcing basic skills proficiencies through, and in relation to, vocational subject matter. The program provides an alternative school experience for high school-age students who cannot cope with the regular high school program, either academically or socially. The curriculum, which includes development of basic skills, vocational development, personal and vocational counseling, and job placement and follow-up, is implemented in two phases through the Occupational Learning Center. The first phase concentrates on developing basic proficiencies in general reading skills, vocabulary, English grammar, and arithmetic. The second, while continuing to upgrade these skills, also includes social studies, English, health, and science. It also promotes an in-depth understanding of the world of work, including the principles of work, the problems of the working adult, the structure and nature of labor unions, government, economics, consumer education, and national and international cultural institutions.

Throughout the program, all students take part in career planning and preparation activities. These many include vocational/technical training, on-the-job training, intensive work experience in a specialized skill area, and/or preparation for higher education.

Inservice Training Programs

Inservice training for vocational teachers in basic skills instruction does not appear to be a popular approach. This may be because inservice training requires a fiscal investment beyond the ability and/or interest of many local districts to make. The *quid pro quo* arrangements described previously require time and personnel reallocations that are relatively cheap compared to the purchase of training. The single example of this strategy uncovered by this search (the Vocational Reading Power project), however, is being disseminated through the National Diffusion Network as an innovation that has met the performance standards of the Joint Dissemination Review Panel, thus testifying to the power and effectiveness of this strategy.

The Vocational Reading Power project is "a staff development program designed to help content-area teachers minimize the gap between student reading abilities and the reading requirements of printed instructional material" (*Educational Programs that Work*, p. 9-74). The program consists of five components: testing, readability analysis, reading in the content areas, vocabulary development, and an instructional material resource system. Through this project, content-area teachers are provided with specific skills—not merely in providing reading instruction, but in applying those skills to their specific content areas.

Postsecondary Practices to Reinforce Basic Skills

At the postsecondary level, the typical cooperative effort to reinforce basic skills is—

- school- or program-wide;
  competency-based;
- multiplex in nature (that is, it provides reinforcement in more than one form);
- an organizational subunit (e.g., a learning center or laboratory); and
- self-selected by students.

The typical postsecondary program is a local response to open enrollments. As postsecondary organizations began enrolling a greater diversity of students and a larger number with low levels of proficiency in basic skills areas, these organizations developed institutionalized responses—most popularly, the learning center. These subunits became an organizational locus of instruction and resources in basic skills areas. Most offer required entry-level courses for incoming freshmen; some provide diagnostic testing and remediation. Unlike the secondary schools, the postsecondary schools have tended to respond to the specific problem of remediation for a subset of students with a generalized response—basic skills instruction available to any and all students who desire and/or need it.

This search revealed three basic approaches to basic skills instruction at the postsecondary level: (1) compensatory or remedial programs, (2) designated courses, and (3) learning centers or laboratories. Of the eleven postsecondary programs included in this synthesis, three exemplify Approach #1, three exemplify Approach #2, and five fit Approach #3. Table E in the Appendix displays the sampled programs by type. As was noted earlier, this inventory only covers programs and projects reported in national outlet data bases. Since the majority of these programs are supported with local, or state and local dollars, many are unreported in national outlets. The reader should view these descriptions as necessary but not sufficient data in understanding the current practices of postsecondary schools for reinforcing basic skills.

The primary instructional approach utilized across program types was some form of individualized instruction. Whether competency-based, programmed instruction, or mastery learning was the mode, nearly all were characterized by attention to individual needs and interests.

Compensatory or Remedial Programs

Compensatory or remedial programs at the postsecondary level are designed to serve those students whose basic skills proficiencies are sufficiently low to interfere with the satisfactory completion of their vocational courses of study. Some programs, like that reported by Huhn (1976), screen all students and provide remediation to those below certain levels of competency.

Others admit students on the basis of high school records and student self-selection. In nearly every instance the remedial program is viewed as a prerequisite or preparation for entrance to a regular vocational program. These remedial courses are designed to help students "catch up," to overcome academic deficiencies carried over from high school.

An example of a remedial program is the Technical Development Curriculum (Murphy 1974). It is somewhat unusual in that it is designed for students without high school diplomas. In that sense it is truly a transition program between high school and the postsecondary vocational curriculum. The primary goal of the remedial program is to prepare students with academic deficiencies and/or uncertain career goals for regular vocational or technical programs. Depending upon the students' needs, the program may be terminal, leading directly to job entry (Murphy 1974, p. 86). The curriculum provides a wide array of vocational and academic courses, which become the basic building blocks of individual curricula.

Designated Courses

This approach closely parallels the "support-oriented" programs at the secondary level. Here we find specific courses in basic skills areas, but infused with a vocational content. In some cases these are generalized courses—for example, special math classes for drafting or technical fields. The aim of these courses is to help students be more successful in their vocational program. These courses nearly always carry college credit, and the student takes these support courses as an integral part of his or her vocational program. This strategy is not targeted to specific student subgroups or ability levels, but rather to vocational content or program areas.

The development of these courses involves the joint efforts of vocational and academic-area teachers. At the postsecondary level this cooperation is difficult to initiate and sustain because (1) not all vocational schools employ academic-area teachers and (2) when they do, the teachers are located in different departments. More than any other approach, this one exemplifies true cooperation between vocational and general education.

An example of this type of cooperation is the College Reading and Study Skills course (Hosey and Rapaport 1976). This course is offered in conjunction with the introductory courses offered by the business department. The reading and study skills course limits itself to business content (for example, the business text is utilized as a source book), while emphasizing test-taking skills, dictionary skills, and reading skills. Frequently assignments from the business course are used to illustrate problems in writing and organization.

Learning Centers and Laboratories

Learning centers or laboratories are the most comprehensive approach to coordination between vocational and general education in reinforcing basic skills. The centers are durable organizational subunits with identifiable interests and activities. They modify the very nature and structure of the organization. However, as these centers become viable subunits, they ultimately lead to the *disjunction* of vocational and general education; they become a separate academic unit of a total vocational organization.

The example of the Allied Health Learning Center at New York City Community College conveys the range of activities and services these centers can provide (Tuosto and Beitler 1976). The Allied Health Learning Center is a comprehensive network system designed to support and facilitate learning in seven different career departments within the Division of Allied Health.

Utilizing a team of content faculty, specialists in learning methodology, and a media production staff, the center serves approximately 1,800 students and 80 faculty members.

This center supports the following activities:

- A freshman course, "Professional Learning System," aimed at the development of reading and study skills
- Diagnostic testing
- Maintenance of a comprehensive student data system
- The provision of instructonal modules that support and supplement regular courses
- The development of multimedia teaching aids
- Informal study group sessions
- Peer tutoring
- Faculty workshops and seminars
- Licensure and certification seminars for students
- Career information and counseling
- General professional development activities (e.g., seminars, lectures)

Summary and Conclusions

The programs upon which this synthesis is based represent central tendencies. While other approaches may exist, the predominant cooperative efforts between vocational and general education to reinforce basic skills fall into these types:

1. Secondary-level approaches
   - Compensatory
   - Support-oriented
   - Alternative schools
   - Inservice training
2. Postsecondary-level approaches
   - Compensatory
   - Designated courses
   - Training centers

These approaches to providing instruction in basic skills have been described in terms of a *strategy* (e.g., providing compensatory instruction for students whose skills are deficient or providing academic and basic skills support for students enrolled in particular vocational areas) and in terms of an *organizational arrangement* for implementing that strategy (e.g., courses, programs, and centers/schools). Table 3 displays strategies as related to organizational arrangement and educational level.

TABLE 3

REINFORCEMENT STRATEGIES BY ORGANIZATIONAL ARRANGEMENT AND LEVEL

Organizational Arrangement	Organizational Level	
	Secondary	Postsecondary
Courses	Support Strategies	Compensatory and Support Strategies
Programs	Compensatory Strategies	Compensatory and Support Strategies
Centers/Alternative Schools	Compensatory Strategies	Compensatory and Support Strategies

Two points need to be made with regard to table 3:

1. At the secondary level, compensatory strategies are more frequently used than support strategies for reinforcing basic skills.

2. At the postsecondary level, multiple strategies are more common.

A possible explanation for these differences can be found in the concept of *organizational coupling*. Coupling refers to the "glue" that holds organizational elements together—for example, units, levels, and individuals; problems, solutions, and decisions; and intentions, processes, and outcomes. In the case of secondary and postsecondary schools we see a differential coupling or tie to the clients (students) of the organization. Secondary schools are loosely coupled to their clients. Attendance is socially, if not legally, compulsory; public secondary schools are *institutionalized* organizations. The public secondary school does not have to respond to client interests or needs in any regular, predictable, or efficient fashion. The majority of students will attend school regardless of the satisfactoriness of its curriculum.

On the other hand, postsecondary schools are more tightly coupled to their clients, in part because their clients are more loosely coupled to them. Postsecondary schools interact with a largely adult population, who enter, select courses, and exit at their own discretion, for a variety of different purposes. The organization needs to offer the broadest range of services to an equally broad range of clients in order to remain solvent. Thus, the postsecondary schools tend to organize highly flexible and broad-based responses to client needs and interests.

It is also true, though, that for both secondary and postsecondary schools, the arrangements used to reinforce basic skills serve also to buffer or protect the central organizational functions. Courses, programs, and centers or alternative schools are all techniques for encapsulating organizational problems. The secondary-level functions of academic preparation and the postsecondary functions of vocational preparation proceed apace, undisturbed by low-achieving, disaffected, or uncertain students. That is, in most cases, the typical vocational instructor is required to do very little regarding formal instruction of low-achieving students in basic skills areas.

IMPLICATIONS FOR RESEARCHERS, POLICYMAKERS, AND PRACTITIONERS

The information in the preceding sections summarizes and integrates current research and practice within the broad area of basic skills and vocational students. In this final section the implications of that information for researchers, policymakers, and practitioners are outlined.

Implications for Researchers

The research on basic skills and vocational students is not a rich literature. Most of the research aggregated was obtained from national surveys of American youth. As vocational educators turn their attention and resources to the problems of developing and providing for the instruction of their students in basic skills, this situation is sure to change. Researchers' attention needs to be focused on (1) improving the *methodological adequacy* of available research and (2) filling in *substantive gaps*.

Methodological Issues

Methodological problems in the areas of curriculum designation and the measurement of basic skills confound research in this area. Four issues need attention.

1. Systematic differences by track in student background and ability confound our estimates of curricular effects on basic skills proficiencies.

The academic stratification of curriculum enrollment leads to systematic overestimation of the effect of curriculum on basic skills proficiencies. Consider vocational and academic students. We know that students typically enter the vocational program approximately one standard deviation below academic track students. If vocational students gained in proficiency at the same rate as academic students, they would complete their program in the same relative position—roughly one standard deviation below the academic students. But achievement stratification by tracks may also stratify students by rate of growth. At the very least it marks great differentials in student potential to learn and grow. One effect of differential patterns of growth is that the curricula enrolling the fastest learners will show the greatest benefits. This confounds our efforts to estimate the effects of the vocational curriculum since we knew a priori that the vocational track enrolled a group of the least able students.

Other pre-enrollment differences that affect our estimation of curricular effects include aspiration and social supports (Alexander, Cook, and McDill 1977).

Pre-enrollment controls for achievement, motivation, and social supports generally serve several functions. They mediate almost all of the effects of exogenous SES variables on

curriculum enrollment, as well as absolutely increase by 10 percent the explained variance in enrollment in a college track. They also mediate prior influences and, more importantly, induce substantial unique variability in senior high school outcomes subsequent to curriculum enrollment relative to that obtained when background and ability alone are used to explain these outcomes. (Alexander, Cook, and McDill, 1977, p. 17)

The effect of student background variables in research on curricular effects is sometimes labelled "self-selection bias." Econometricians working in this area are attempting to deal with this bias through the development of structural equations that can, within certain confidence ranges, predict curriculum enrollment. In that way the *effects* of curriculum enrollment can be examined distinctly from the background variables affecting curriculum *selection*.

2. Student self-report of curriculum enrollment is not an adequate representation of actual course experiences.

The issue of curriculum designation is a particularly troublesome one, since there are no clear and reliable tracks or curricula to which students are explicitly and reliably assigned. Curriculum placement, by and large, is a post facto interpretation of student course selections. Most researchers have used student self-report as an indicator of curriculum or "track" enrollment and then bemoaned the unreliability of these data. Fetters (1975) provides data indicating that: (1) compared with school administrators' classifications, students tended to overselect the academic track; (2) both students and administrators seem uncertain as to the difference between general and vocational tracks; but (3) both groups consistently are able to distinguish between academic and vocational tracks. Hilton (1971, p. 42) reports that as high as 20 percent of the students sampled in the Academic Growth Study just did not know which curriculum they were enrolled in.

Recent analyses of the Longitudinal Study of Educational Effects (Class of '72) data base reveal that neither student self-report nor administrator classification accurately describes a student's actual course of study. A possible solution to this difficulty is suggested by Grasso and Shea (1979, p. 107) who suggest that self-report data be interpreted, not as proxies for actual instructional experiences, but as proxies for student orientations to those experiences. Students receive more or less vocational training depending upon the number and type of vocational courses they are enrolled in. But students often orient themselves to those course experiences based upon the interaction of a number of background and attitudinal variables, such as self-image, future plans, peer group, father's occupation, and so on.

Another solution to this problem is to avoid student self-designation and to use actual course enrollments to indicate participation in vocational education. Recent work at the National Center for Research in Vocational Education (Campbell, Orth, and Seitz 1981 and Campbell et al. 1981) has resulted in a typology of participation from the limited incidental/personal participation through exploration to truly concentrating in a vocational program area. Although this concept of "patterns" of participation is relatively untested, it holds great potential as both a conceptual and practical tool for distinguishing different categories of vocational enrollees.

3. The measurement of curriculum effects on basic skills proficiencies requires the selection of a standard or criterion by which to assess gains.

Two standards have been commonly employed:

- **intravocational comparisons**, using the initial proficiency of vocational students as the standard by which to assess post-program proficiencies.

- **Vocational-academic comparisons**, using the gains of academic track students as the standard by which to assess the gains of vocational students. As was observed by Alexander and McDill (1976), "being in a college track is worth about 26 percent of a pooled within-school standard deviation on the PSAT quantitative battery" (p. 12).

Neither standard is completely satisfactory. In the first instance we have no way of assessing the adequacy of the gain in proficiency from vocational program entry to exit. In the second instance we discover that vocational students, the least able academically, gain less than college preparatory students, the most able.

Two alternative standards could also be used, although with some methodological difficulty. First, we could assess the gains of vocational students relative to general track standards. Whether they are more or less academically able, general track students are closer in ability to vocational students than academic track students. And there is some evidence that vocational students are making gains in basic skills areas that equal and sometimes surpass those of general track students.

Alternatively, we could assess the gains of vocational students against predictions of their performance without experiencing the vocational curriculum or having dropped out of school. The only evidence in this area comes from Wiley and Harnischfeger (1980) who predicted from LSEE data the effect of differing instructional experiences on students from differing ability and background characteristics.

> Giving pupils with . . . poor backgrounds extensive academic training and not taking up study time with work will improve their test performance on measures of academic ability to a significant but not extraordinary degree. But, lessening the amount of academic instruction and increasing vocational education and work experience of students from families with good educational backgrounds will cause a severe deterioration in test performance. . . . Academic program students lose much more in test performance by having course and work experiences like vocational students than vocational gain students gain from acquiring experiences like the academic pupils. (p. 79)

4. It is not entirely satisfactory to compare higher and lower ability students using a single test instrument.

Most of our data on the basic skills proficiencies of vocational and other students are obtained using standardized test instruments, such as the Sequential Tests of Education Programs (STEP), the School and College Ability Test (SCAT), the Preliminary Scholastic Aptitude Tests (PSAT). It is possible that these data may be confounded to some extent by "floor" and even "ceiling" effects generated by the test instruments.

Tests in which groups of students score either very high or very low suffer from ceiling and floor effects. These effects reflect the inability of the test instrument to accurately distinguish among students at its upper and lower ranges. Both effects make the calculation of gain scores unreliable. The problem in comparing the gains of vocational students with the gains of academic students may be analogous to comparing compensatory education participants with nonparticipants:

> The problem with choosing a lower test level to fit the achievement range of compensatory education participants is that regular students are likely to score at the ceiling of that test and comparisons using two different tests would rely too heavily on the test publisher's articulation between the levels. (McLaughlin, Gilmartin, and Rossi 1977, p. 108)

The solution to this problem is in selecting test instruments appropriate to the students' abilities and learning experiences. For example, Ludeman (1976), in reporting on the performance of Minnesota seventeen-year-olds, states that "the analysis of objectives supports that vocational education students, though they may be exposed to fewer high level concepts, are proficient in making practical applications of their mathematical skills" (p. 6). The Minnesota vocational students, tested with the Minnesota statewide assessment instrument, did not lag behind their academic peers in math performance as measured by practical applications.

Substantive Gaps

Little will be added to our reservoir of knowledge by providing additional evidence that vocational students are less proficient in basic skills areas than academic track students. However, our curriculum development and policy planning efforts would be greatly enhanced by evidence offering plausible explanations for that difference. The following problem areas and related questions are likely to be fruitful avenues for *descriptive research*:

1. **Distinguishing vocational and general track students.** Although these two groups are apparently similar in terms of cognitive abilities, we have some evidence that they may be distinguishable on a range of affective characteristics (interest in school, plans for the future). What contextual characteristics seem related to these differences, if any? How are these differences related to completing high school?

2. **The growth of basic skills in vocational students.** As Corman (1980) noted, there is a wealth of data relevant to this problem in local and state education agency files. Beyond that we need to pursue the issue of time on task in basic skill areas in the vocational curricula. Are vocational students given an opportunity to learn, practice, and extend their basic skills proficiencies?

3. **The role of basic skills in job placement.** If the youth labor market is essentially a market for training opportunities, how do youth signal their trainability to employers? What does a high proficiency in basic skills areas signal to employers?

4. **The role of vocational education in retention.** Does the vocational curriculum play a role in keeping youth in school? If so, what is it? Does the vocational curriculum offer youth more relevant curricular experiences, more successful experiences, more practical experiences?

5. **Intravocational differences.** The proficiency of vocational students in basic skills surely varies by program area, as does the relationship of basic skills to later employment and earnings. What is the nature of these differences and how can the various programs best provide for the development of basic skills for their enrollees?

Despite the fact that vocational education is not currently supported to provide instruction in basic skills, vocational educators are finding ways to do just that. These strategies have been, by

and large, locally developed. Few have been systematically evaluated. The following problem areas and questions are likely to be fruitful avenues for *evaluative research*:

1. **The efficacy of different strategic approaches.** As previously noted, there are various approaches to supplying vocational students with instruction in basic skills. Can approaches be matched to organizational context, occupational area, or student ability level? What are the short- and long-range consequences of special instruction in basic skills for vocational students? What are the cost-benefit ratios for various approaches?

2. **The effectiveness of career guidance and counseling programs.** There is no shortage of evaluation studies in this area but no major study has systematically explored the clues or guidance that students receive and use in choosing pathways through the high school curriculum. Do students receive equitable counseling? If not, why not? Are these organizational clues or signals students receive that direct them to certain courses?

Implications for Policymakers

The policy implications of the preceding sections can be summed up as two broad issue areas. These areas encompass broad social concerns and fairly specific curricular modifications. These issues have no "right" solution; instead they are foci for discussion, take-off points for experiments, rallying points for philosophic perspectives.

1. **Is a high school curriculum that is stratified directly by ability and achievement and indirectly by socioeconomic status acceptable in a democratic society?**

The implications of a stratified school curriculum are nested in the issues of equity and access to education and its concomitant social benefits. If curriculum enrollment (or the perception of curriculum enrollment) can be predicted from such ascriptive characteristics as socioeconomic status, race, or ability, then the spread of educational resources across and among tracks becomes critical. If educational resources and benefits are differentially allocated to tracks, and if students are nonrandomly distributed to those tracks, then our secondary school curriculum is systematically denying some groups of students equitable access to the primary and secondary benefits of education.

> The non-random distribution of students to tracks appears to circumscribe a pool of potential associates such that college preparatory students are more likely to establish close ties with peers whose competencies and interests are consonant with the formal objectives of the school. (Alexander and McDill 1976, p. 19)

Alternatively, the stratified curriculum can be viewed as a mechanism that provides the "best" and most appropriate education for each individual student. Hilton (1971) concluded that students self-selected into the various curricula based on assessments and perceptions of their abilities.

> The staff repeatedly gave the impression that "early school leaving" would have been more prevalent than it was if the non-academic programs had not offered an interesting and challenging alternative to many students who were frustrated by the college preparatory curriculum. (Hilton 1971, p. 175)

The varied school curriculum may allow those youngsters whose abilities and interests are not congruent with the formal objectives of schooling to (1) avoid the liabilities of dropping out, while (2) developing saleable occupational skills and interests.

On the one hand this stratification permits flexibility, while on the other hand it works against social goals of unity and cohesion. Policy planners and educators need to think through the following questions:

- Does this stratification reflect society's attitude toward expectations for less able students, i.e., that they will be less successful socially and economically?
- Does the present stratification permit or inhibit maximum growth by individuals? Are the lower strata mechanisims for "cooling out" certain groups, or do they represent society's best efforts to provide the best education possible for each student?

The implications of these data for policy planners and decision makers are nested in the differences of making equitable policies for a school population that is essentially unequal. Schooling and society as they currently operate provide the greatest rewards to those most able in academic areas. Yet, they also provide alternative paths to more modest rewards for those who are less able. The dilemma that policymakers face is encouraging maximum achievement in basic skills areas for all students, yet providing education and training experiences that do not require high levels of expertise in these areas for those less able. The dilemma for vocational educators is how to maximize the basic skills proficiencies of vocational students within the structure and resources of an occupational curriculum.

2. **What kind of curriculum is most appropriate and beneficial to the non-college-bound youth?**

If one conceptualizes vocational education narrowly, as a skills training program for those less able academically, then one would expect (1) a curriculum offering fewer and less challenging tasks using basic skills and (2) students performing at lower levels of proficiency in basic skills areas. If, on the other hand, one conceptualizes vocational education more broadly, as a total preparation for employment-bound youth, then basic skills proficiency becomes curricular objective in its own right and a criterion of program success.

The relationship between basic skills proficiencies and vocational program outcomes lies nested among larger questions about the relationship of academic ability to life changes and the effects of schooling. *For secondary school students in general, achievement in basic skills is positively related to educational attainment* (Alexander and McDill 1976; Grass and Shea 1979; Gelb 1979; Jencks 1972; Tinto 1977; O'Malley, Bachman, and Johnston 1977). Students who perform well on tasks valued and rewarded by schools generally persist with their education. Increased educational attainment is widely believed to be associated with upward social mobility and increased earnings.

However, the generalization that more education leads to greater wages is imprecise. Jencks (1972) points out that:

> The financial return to extra schooling derives almost exclusively from the fact that schooling provides men with access to highly paid occupations, not from the fact that it enables men in a given occupation to earn more. Giving everyone more credentials cannot provide everyone with access to the best-paid occupations. It can only raise earnings if it makes people more productive within various occupations. There is little evidence that it will do this. (p. 224)

When we recall that vocational students are typically among the least able academically and in the lower socioeconomic strata, we see a group for whom increased educational attainment will probably yield marginal returns. Individually, however, the more able vocational students will probably persist in school longer, earn more, and work in more prestigious occupations than their less able counterparts.

Additionally, we know that vocational students enroll in fewer academic courses than college preparatory students, and thus the smaller gains in achievement by vocational students may only be reflective of instructional experiences that do not emphasize achievement in basic skills areas.

Current research has underscored the importance of "time on task" for increasing student achievement (Harnischfeger and Wiley 1976; Fisher, Marliave, and Filby 1979). We expect that the academic or college preparatory track would provide plentiful opportunities to use, practice, and develop basic skills on a daily basis. But what about vocational students? What part of their curricular experiences demand proficiency in basic skills? Are vocational students given enough time on basic skills tasks?

Presently the curriculum for non-college-bound youth is less prestigious within the high school than the academic curriculum. The structure, traditions, and expectations for our schools are centered on academic achievement and college enrollment. What mix of content will provide the non-college-bound youth with maximal preparation in basic skills areas, occupational skill areas, and social and citizenship areas? Can this be achieved within the present curricular structure of the comprehensive high school? What does this imply for the funding of vocational education?

Implications for Practitioners

The evidence presented in the first section of this monograph pointed out the generally low levels of performance of vocational students in basic skills areas, while the second outlined current practices for improving that performance. In this section suggestions are made to practitioners—local administrators, supervisors, and teachers—for effectively responding to the need *within* the vocational curricula.

1. **Achievement in basic skills should be reinforced as a valued and valuable curricular objective.**

Research on school effectiveness has shown that when basic skills achievement is a clearly articulated and widely communicated curricular objective, school performance in basic skills areas is higher than in schools where it is not (Clark, Lotto, and McCarthy 1980). Vocational educators at the local level have tended to reinforce the occupational skill outcomes of vocational programming. If the performance of vocational students in basic skills is to be improved, that outcome must be consistently and explicitly emphasized as a curricular objective. It needs to be communicated to, and understood by, all involved participants—students, teachers, parents, and employers.

2. **Vocational teachers need pre- and inservice training in providing reinforcement and practice in basic skills areas.**

Vocational teachers will be unable to meet the curricular objective of basic skills emphasis without training. In some states this training is a prerequisite for licensure and is provided during preservice training. In other states training in basic skills instruction for vocational teachers will only occur through local inservice efforts. In both situations, though, local administrators will want to provide appropriate inservice training to reinforce and improve local teachers' expertise. Specific training, given in support of an explicit curricular emphasis, will have a greater impact than either the objective or the training singly. Vocational teachers need to be able to provide learning and practice opportunities for their students in basic skills. They need to be able to diagnose student problems and provide or obtain appropriate remediation.

3. **The instructional materials selected for use in vocational classrooms must be appropriate for the skill levels of the students who will use them.**

In order for a student to use and practice basic skills in vocational classrooms, the materials to be used must be developed at a level of difficulty that matches or at least approximates the performance level of the student. In cases where this is very disparate, new materials may need to be developed; in other cases students may need extra help in order to fully utilize available materials. The point is that teachers and administrators attend to the level of difficulty of texts and strive to match them to student performance levels.

Taken together these three suggestions have the potential to markedly influence the level of proficiency of vocational students in basic skills. They suggest the need for *attention*—an emphasis on basic skills, *time*—classroom opportunities to learn and practice basic skills, and *materials*—matched to student abilities.

APPENDIX
SEARCH STRATEGIES AND SAMPLE CHARACTERISTICS

The final inventory of studies for each substudy was developed from searches of the following data bases:

1. The ERIC files from 1966 to the present
2. *Current Projects in Vocational Education: Federally Administered Projects FY 1970-77*
3. *Current Projects in Vocational Education: State-Administered Projects FY 1978-80*
4. *Dissertation Abstracts*, 1979 and 1980
5. *Educational Programs that Work*, 7th edition, 1980
6. References and citations from studies located in any of the above plus those described in other major synthesis efforts (i.e., Berryman 1980; Brown et al. 1980; Corman 1980; Long 1980; Mertens et al. 1980; and Thornton 1980).

The initial search of these sources yielded over two thousand nominations for inclusion. The first screening of title and abstract for substantive relevance reduced that number to 537. At this point, specific decision rules were developed for selecting the final sample in each area. Those rules are reported in the appropriate sections of the text. In general both a substantive and a methodological criteria was used in selecting studies. The study samples and key characteristics are reported in the following tables, one for each substudy or analysis:

- Comparing Vocational and Nonvocational Students (table A)
- Developing basic skills from program entry to completion (table B)
- Relating basic skills to program outcomes (table C)
- Describing cooperative practices for reinforcing and remediating basic skills (tables D and E)

TABLE A

COMPARING VOCATIONAL AND NONVOCATIONAL STUDENTS: STUDY CHARACTERISTICS

Data base	Scope of Observation of Basic Skills Proficiencies	Points of Measurement of Abilities	Sample Size	Sample Adequacy	Mode of Designating Curriculum Placement	Generalizability
Academic Growth Study (Hilton 1974) (Alexander, Cook, McDill 1977)	School and College Ability tests (SCAT) Sequential Tests of Educational Progress (STEP) Preliminary Scholastic Aptitude Tests (PSAT) Test of General Information Background and Experience Questionnaire	Students in grades 5, 7, 9, 11 tested every two years until graduation—begun in 1961	17 communities 27 schools— 9,000 5th graders 9,000 7th graders 9,000 9th graders 5,500 11th graders 27 schools in 12 communities	"Core" sample shrunk by 15% actual sample grew by 25% with such testing. Study tested all students in relevant grades in study schools, Sample slightly under-represents low SES and slightly over-represents high SES students.	Self-report Student must indicate either academic, agricultural, business, general, home economic, vocational, other, undecided.	National
Longitudinal Study of Education Effects (Class of 72) (Creech 1974) (Echternacht 1975)	Specially developed test battery— vocabulary picture number reading mathematics composite ability Also centile class rank	Grades 12—1972 and biannually thereafter	17,726 high school seniors. Approximately 5,000 added at first follow-up	Nonrespondent bias—small, southern schools, students who are less able, more mobile, and planning to enroll in technical schools.	Self-report and administrator designation—academic, general vocational	National
Project Talent (Evans and Galloway 1973)	Specially developed aptitude and achievement tests	Grades 9-12—1960 Follow-ups of grades 9, 10, 11, 12 every four years for three follow-ups	440,000 secondary school students 47% of high schools represented	High attrition rates, Samples have been reweighted; original sample significantly underrepresented upper class, high ability students	Self-report Students selected from general college preparatory, commercial preparatory, commercial vocational, or other.	National
Equality of educational opportunity (Heyns 1973)	Specially developed aptitude and achievement tests derived from STEP, in Inter-American Tests of General	Grades 3, 6, 9, 12 13. Single data collection only, Sept. 1965	15,384 12th graders 15,894 9th graders	"The 48 schools selected were larger, slightly more affluent in terms of facilities and staff, and more likely to be integrated than the 'typical' American high school." (Heyns, 1973, p. 1437).	Self-report	National

TABLE A (continued)

Data base	Scope of Observation of Basic Skills Proficiencies	Points of Measurment of Abilities	Sample Size	Sample Adequacy	Mode of Designating Curriculum Placement	Generalizability
National Longitudinal Survey of Labor Market Effects* (Grasso and Shea 1979)	Test scores reported by school administrators in a national survey conducted by Bureau of the Census in 1968. These were pooled to form a single measure scaled similarly to I.Q., i.e., mean to 100, and standard deviation of 15.	Males, ages 14–24, 1966 Females, ages 14–24, Biannual follow-ups thereafter	Approximately 5,000 males, ages 14–24 Approximately 5,000 females ages 14–24	Blacks oversampled relative to whites	Self-report	National
CSOS Educational Climate Data (Alexander and McDill 1976)	Project Talent instruments, one measuring Abstract Reasoning, one measuring achievement in Mathematics, Academic rank. Grade point average in English.	Grade 12, 1964 and 1965	4,343 12th graders	20 public high schools, purposefully sampled to maximize variation.	Self-report; Responses dichotomized into college preparatory and other.	National
Massachusetts Assessment of Basic Skills. 1978–79	Specially developed instruments: math, reading, and two writing samples.	Grade 12	4,141 – reading 4,020 – math 3,310 – writing all 12th graders	Attrition rate of 31% was due to inflated enrollment and absenteeism.	Self-report	State - Massachusetts
Minnesota Statewide Educational Assessment, Mathematics	Specially developed instruments.	Grade 12 (17 yr. olds)	Approximately 16,000 17-year-olds	Random sample of students in Minnesota public and nonpublic schools.	Years of vocational courses, e.g., 1 or 2, 3 or 4, 5+.	State - Minnesota
Comprehensive High School (Dennen 1979)	SAT Verbal SAT Nonverbal SRA Language SRA Math SRA Composite Grade Point Average Class Rank	SRA – fall of 8th grade year or 1975 SAT – 1978	363 high school students, class of 1979	Entire population utilized	Researcher designated: Art, Music, Home Economics, Business, Industrial Arts, Community Service, Work Experience, Adv. Foreign Language, Adv. Math, Adv. Science, No Foreign Language	Local – case study
Comprehensive High School (Walter 1979)	Reading Achievement: STEP	Grades 10, 11, 12 1978	164 students in a 1978	Small sample Canadian urban high school 5% random	Researcher designated: College Preparatory/ Technical General Education and Occupational Practical	Local–sample generalizable to a single high school

TABLE B

THE EFFECT OF VOCATIONAL CURRICULUM ENROLLMENT : STUDY CHARACTERISTICS

Study References	Study Characteristics		
	Basic Skills Proficiencies Observed	Points Measurement	Generalizability
Hilton 1971	SCAT, STEP, PSAT	Students in grades 5, 7, 9, 11 tested every two years until graduation	National
Alexander, Cook, and	SCAT, STEP, PSAT	Students in grades 5, 7, 9, 11 tested every two years until graduation	National
Evans and Galloway 1973	Specially developed aptitude and achievement tests	Grades 9 and 12	National
Ludeman 1976	Math only– specially developed achievement test, both practical and theoretical skills	Grade 12	Statewide

TABLE C

RELATIONSHIPS OF BASIC SKILLS TO PROGRAM OUTCOMES: STUDY CHARACTERISTICS

Study	Indicators of Basic Skill Proficiency	Program Outcomes Assessed
Secondary		
Berryman 1980	NLS-scholastic aptitude LSEE	Educational attainment Earnings
Darcy, Kauffman, and Milker 1974	IQ Class rank curriculum enrollment	Employment success i.e., wages
Hilton 1971	School and College Ability Tests (SCAT) Sequential Tests of Educational Progress (STEP) Preliminary Scholastic Aptitude Test (PSAT)	Educational attainment
Hofferth 1980	NLS data base: Curriculum enrollment Scholastic Aptitude	Earnings
Kapes 1972	General Aptitude Test Battery (GATB)	Program success as determined by relation to median GPA
O'Reilly 1972	Grade point average Ohio Trade and Industrial Education Achievement	Grade point average in grades 10 and 11
Stock and Pratzner 1969	Differential Aptitude Test (DAT) GATB GPA IQ	Program completion
Wiley and Harnischfeger 1980	LSEE	Educational attainment Earnings

TABLE D

REINFORCING BASIC SKILLS
SAMPLE PROGRAMS BY TYPE, POSTSECONDARY LEVEL

Type	Program
1. Compensatory	Huhn 1976 Murphy 1974 Remedial Program A Remedial Program B
2. Designated Courses	Blicq 1977 Hosey and Rapaport 1976 Jones 1972
3. Learning Centers	Beitler and Martin 1971 Crowl 1976 Elliott 1976 Tuosto and Beitler 1976

TABLE E

REINFORCING BASIC SKILLS: SAMPLE PROGRAMS BY TYPE, SECONDARY LEVEL

Type	Program
1. Compensatory	Dickson 1973 "Georgia's Winning Way" 1979 Holms 1979 Johnson 1973 Kaufman and Lydiard 1971: a. Work-Study Program b. Diversified Occupations Program Thompson 1971 Toney 1974
2. Support-oriented	Schuberg and Cannon 1972 Magram, Weinger, and Gold 1970 Schuberg and Canon 1972
3. Alternative	Satellite Academic Programs 1972 Wolff 1973
4. Inservice Training	Education Programs that Work 1980

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